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N. A. PREOBRAZHENSKIY'S WORK IN THE FIELD OF ALKALOIDS

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Prof N.A. Preobrazhenskiy received one of the 1951 Stalin prizes, first class. For many years, he has been studying the chemical structure of alkaloids. He was awarded a Stalin Prize for research on the synthesis of alkaloids, which was published in the periodicals Doklady Akademii Nauk SSSR, and Zhurnal Obshchey Khimii, during 1949 - 1951.

The synthetic preparation of alkaloids has long been the objective of organic chemists. However, only after A. M. Butlerov's introduction of the theory of chemical structure did it become possible to explain the structure of these complex substances and to synthesize them.

Soviet scientists have been successful in the isolation and study of these compounds. For example, over a comparatively short period, 108 new alkaloids have been discovered and isolated. A USSR alkaloid industry was set up during the Stalin Five-Year Plans. The works of Preobrazhenskiy, together with the classical investigations of Academician A. P. Orekhov, the founder of alkaloid-chemistry, and also those of Academician V. M. Rodionov and others, have great theoretical and practical value.

Preobrazhenskiy was the first to succeed in developing a method for the synthetic preparation of natural pilocarpine, thus solving a problem over which a great number of foreign scientists had labored in vain. Pilocarpine, which is found in the leaves of the plant Pilocarpus jaborandi (grown in Brazil), is one of the most valuable alkaloids from the practical standpoint. At present, pilocarpine is widely used in medicine for the treatment of glaucoma and certain other eye diseases.

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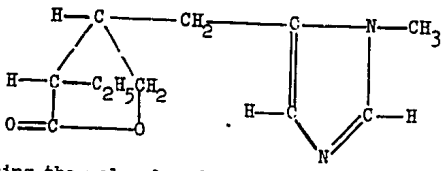
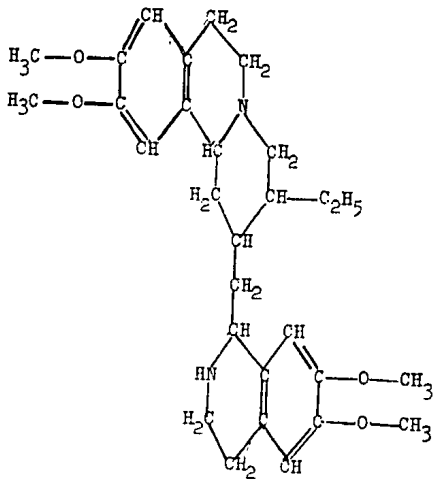
Having completed a whole series of delicate synthetic investigations with his collaborators, Preobrazhenskiy not only demonstrated the complete identity of natural and synthetically-prepared pilocarpine, but also accurately determined its structure, which can be represented in the following manner:



By altering the molecule of pilocarpine, Preobrazhenskiy succeeded in greatly reinforcing its therapeutic activity. Thus, an analogue of pilocarpine, benzylpilocarpidine, proved to be more active and produced a beneficial effect in cases where pilocarpine itself showed no effect. By developing and perfecting the synthesis, Preobrazhenskiy devised an industrial method for producing pilocarpine.

During 1950 - 1951, Preobrazhenskiy and his collaborators succeeded in synthesizing another alkaloid, emetine, which has an even more complex structure. Emetine is a remedy for amoebic dysentery and is indispensable for the treatment of severe forms of this disease. In addition, emetine can be used successfully for the treatment of a number of other human diseases.

A molecule of emetine has the following structure:



Thus, as the result of Preobrazhenskiy's work, the structure of a great number of complex natural compounds was determined. In addition, as a result of this work, certain compounds extremely valuable in medicine, which were previously derived from tropical plants, can now be produced synthetically.

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